21.1 Spectroscopic Identification of Organic compounds

Question Paper

Course	DP IB Chemistry
Section	21. Measurement & Analysis (HL only)
Topic	21.1 Spectroscopic Identification of Organic compounds
Difficulty	Hard

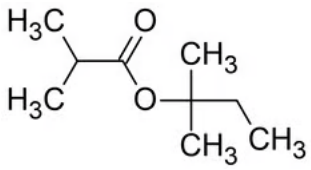
Time allowed: 10

Score: /5

Percentage: /100

Question 1

The structure of 2-methylbutan-2-yl 2-methylpropanoate is shown below.



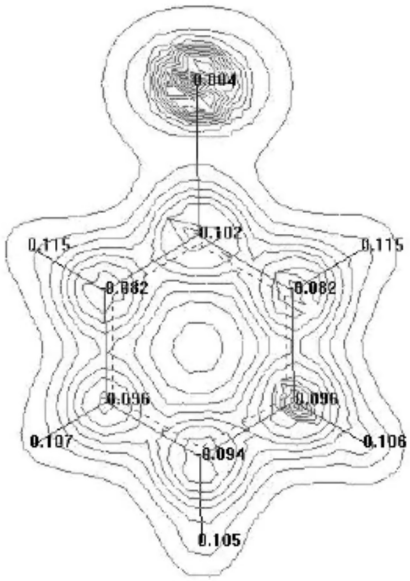
How many signals would be found in the ^{1}H NMR spectrum of 2-methylbutan-2-yl 2-methylpropanoate and what would be the ratio of the peak areas?

	Signals	Ratio of peak areas
A	3	2:2:1
B	4	6:6:3:2
C	5	6:6:3:2:1
D	5	3:3:3:2:1

[1 mark]

Question 2

Which benzene derivative is represented by the following electron density map?



A. Benzaldehyde

B. Benzoic acid

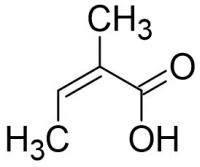
C. Bromobenzene

D. Nitrobenzene

[1 mark]

Question 3

Which of the following statements about angelic acid are correct?



I. The IUPAC name of angelic acid is (*E*)-2-methyl-2-butenoic acid
II. Its ^{1}H NMR spectrum contains a quartet peak
III. It has a molecular ion peak at *m/e* = 100.13

A. I and II only

B. I and III only

C. II and III only

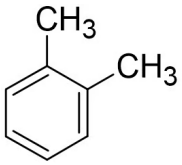
D. I, II and III

[1 mark]

Question 4

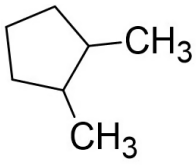
Which compound(s) produces the fewest number of peaks in its ^{1}H NMR spectrum?

I



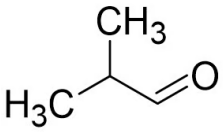
1,2-Dimethylbenzene

II



1,2-dimethylcyclopentane

III



2-methylpropanal

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 5

The ^1H NMR spectrum of CH_3CHCl_2 shows two signals.

What is the correct assignment of splitting patterns for these signals?

	CH_3 group	CH group
A	doublet	quartet
B	quartet	doublet
C	singlet	singlet
D	triplet	singlet

[1 mark]